

## Information Science and Technology Center Seminar



**Juyang (John) Weng, Professor**  
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### "A 5-Chunk Brain-Mind Network Model"

**Tuesday, September 28, 2010**

**10:00 - 11:00 AM**

**TA-03, Building 0207, Study Center,**  
**Cochiti/Jemez Conference Rooms**

**Abstract:** Through over 20 years of cross-disciplinary research, a series of tightly intertwined advances has been made at the EI Lab of MSU in piecing together the vast related literature in biology, neuroscience, psychology, computer science, electrical engineering and mathematics. This talk will discuss a general purpose model of the brain-mind. The model predicts that the brain --- including the spinal cord, the hindbrain, the midbrain, and the forebrain --- is "patched" through evolution by many general purpose brain areas. The working of each area can be understood as a "bridge" representation that assists its two "banks". This model has been supported by a series of experimental studies with several functions that did not have clear prior computational solutions, such as connectionist abstraction, concept emergence, goal-directed top-down attention, and connectionist reasoning. This brain-mind picture requires five (5) necessary "chunks": development (how the brain-mind emerges), architecture (how areas connect), area (how each building block represents), space (how the brain deals with spatial information) and time (how the brain deals with temporal information). This brain-mind model puts two large schools into the same picture --- the symbolic representation school and the connectionist school. The experimental studies include visual attention, visual recognition, stereo (without explicit binocular matching), and early language learning/generalization.

**Biography:** Juyang (John) Weng is a professor at the Department of Computer Science and Engineering, the Cognitive Science Program, and the Neuroscience Program, Michigan State University, East Lansing, Michigan, USA. He received his MS and PhD degrees from University of Illinois at Urbana-Champaign, 1985 and 1989, respectively, all in Computer Science. From August 2006 to May 2007, he was a visiting professor at the Department of Brain and Cognitive Science of MIT. His research interest includes biologically inspired neural systems, computer vision, audition, touch, human-machine multimodal interface, and intelligent robots. He is the author or coauthor of over two hundred research articles, an editor-in-chief of *International Journal of Humanoid Robotics* and an associate editor of the new *IEEE Transactions on Autonomous Mental Development*. He was a program chairman of the NSF/DARPA funded Workshop on Development and Learning 2000 (1st ICDL), the Chairman of the Governing Board of the International Conferences on Development and Learning (ICDLs) (2005-2007, <http://cogsci.ucsd.edu/~triesch/icdl/>), a general chairman of 7th ICDL (2008) and general 8th ICDL (2009), chairman of the Autonomous Mental Development Technical Committee of the IEEE Computational Intelligence Society (2004-2005), an associate editor of *IEEE Trans. on Pattern Recognition and Machine Intelligence*, an associate editor of *IEEE Trans. on Image Processing*. He is a Fellow of IEEE.

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